**Biosupercapacitors**

Sergey Shleev

*a Department of Biomedical Science, Faculty of Health and Society, Malmö University, Skåne, 20506 Malmö, Sweden*

*b Kurchatov NBICS Centre, National Research Centre “Kurchatov Institute”,
123182 Moscow, Russia*

sergey.shleev@mah.se

The lecture will overview recent progress in the development of biosupercapacitors – supercapacitors fabricated using biological materials. In conventional biosupercapacitors the biomaterial serves as the pseudocapacitive component [1, 2], while in self-charging biodevices the biocomponent also functions as the biocatalyst [3, 4]. The performance characteristics of biosupercapacitors are summarised and characterised in the perspective of the broader family of electric power devices [5], including biodevices [6]. Self-charging biosupercapacitors show great promise in pulse-power delivery at the milliwatt level, typically greatly exceeding the capability of free-running bio-fuel and bio-solar cells [7]. Thus, chemical biosupercapacitors might be suitable for powering a new generation of miniaturized electronic applications [8-13], including those intended for use in medical technology, while solar biodevices might be used as highly functional, but at the same time low-cost, environmentally friendly, and technically undemanding electric power sources [14,15].

The author thanks the Swedish Research Council (project 2013-6006) for the financial support.

References:

1. N. Malvankar, T. Mester, M. Tuominen, D. Lovley, *ChemPhysChem*, **2012**, *13*, 463-468.
2. E. González-Arribas, M. Falk, O. Aleksejeva, S. Bushnev, P. Sebastián, J. Feliu, S. Shleev, *Electrochem. Commun.,* **2017**, in press.
3. D. Pankratov, Z. Blum, D. Suyatin, V. Popov, S. Shleev, *ChemElectroChem*, **2014**, *2*, 343-346.
4. C. Agnès, M. Holzinger, A. Le Goff, B. Reuillard, K. Elouarzaki, S. Tingryb, S. Cosnier, *Energy Environ. Sci.*, **2014**, *7*, 1884-1888.
5. D. Pankratov, P. Falkman, Z. Blum, S. Shleev, *Energy Environ. Sci.*, **2014**, *7*, 989-993.
6. D. Pankratov, Z. Blum, S. Shleev, *ChemElectroChem*, **2014**, *1*, 1798-1807.
7. S. Shleev, E. González-Arribas, M. Falk, *Curr. Opinion Electrochem.*, **2017**, in press.
8. M. Kizling, S. Draminska, K. Stolarczyk, P. Tammela P, Wang Z, Nyholm L, Bilewicz R: *Bioelectrochemistry*, **2015**, *106*, 34-40.
9. D. Pankratov, F. Conzuelo, P. Pinyou, S. Alsaoub, W. Schuhmann, S. Shleev, *Angew. Chem. Int. Ed.* **2016**, *55*, 15434-15438.
10. M. Houghton, C. Santoro, F. Soavi, A. Serov, I. Ieropoulos, C. Arbizzani, P. Atanassov, *Bioresour. Technol.*, **2016**, *218*, 552-560.
11. C. Narvaez Villarrubia, F. Soavi, C. Santoro, C. Arbizzani, A. Serov, S. Rojas-Carbonell, G. Gupta, P. Atanassov, *Biosens. Bioelectron.*, **2016**, *86*, 459-465.
12. X. Xiao, P. Conghail, D. Leech, R. Ludwig, E. Magner, *Biosens. Bioelectron.*, **2017**, *90*, 96-102.
13. S. Alsaoub, A. Ruff, F. Conzuelo, E. Ventosa, R. Ludwig, S. Shleev, W. Schuhmann, *ChemPlusChem*, **2017**, *82*, 576-583.
14. E. Gonzalez-Arribas, O. Aleksejeva, T. Bobrowski, M. Toscano, L. Gorton, W. Schuhmann, S. Shleev, *Electrochem. Commun.*, **2017**, *74*, 9-13.
15. G. Pankratova, D. Pankratov, K. Hasan, H.-E. Aakerlund, P.-A. Albertsson, D. Leech, S. Shleev, L. Gorton, *Adv. Energy Mater.*, **2017**, *7*, doi:10.1002/aenm.201602285.